

Facial Rejuvenation and Rhytidectomy: Anatomical Evolution, Surgical Techniques, And Comprehensive Management

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ABSTRACT

This review article synthesizes and critically analyzes the current literature on rhytidectomy (facelift) surgery. It evaluates the underlying surgical anatomy, focusing on the superficial musculoaponeurotic system (SMAS) and the retaining ligaments. Furthermore, it compares the evolution of traditional surgical techniques with deep plane approaches, analyzing their biomechanical benefits. The fundamental role of complementary procedures, such as autologous fat grafting, is discussed, and the importance of comprehensive perioperative management is emphasized. Finally, limitations in the existing evidence are identified, and future directions for research in facial rejuvenation are proposed.

KEYWORDS: Rhytidectomy, Facial rejuvenation, Deep plane, SMAS, Fat grafting, Surgical anatomy.

ARTICLE DETAILS

Published On:
11 May 2026

Available on:
<https://ijmscrs.com>

I. INTRODUCTION

Facial rejuvenation via rhytidectomy remains the most powerful and durable method for correcting the changes associated with facial aging. Despite the recent proliferation of non-surgical interventions, facelift surgery has evolved significantly in recent decades, driven by a comprehensive understanding of the three-dimensional anatomy of the face. Facial aging is a complex, multifactorial process involving alterations in skin quality, volumetric deflation of fat compartments, gravitational descent of soft tissues, and remodelling of the facial skeleton. In response, the contemporary surgical approach has transitioned from simple skin traction to sophisticated manipulations of the deep fascial planes. The objective of this review is to

synthesize and critically analyse the current literature on rhytidectomy surgery, evaluating the underlying surgical anatomy, the evolution and comparison of surgical techniques, the role of complementary procedures, and the paradigms of perioperative management.

II. SURGICAL ANATOMY AND THREE-DIMENSIONAL UNDERSTANDING

The efficacy and safety of rhytidectomy depend on precise anatomical navigation through the facial layers. Anatomically, the face is divided into five main layers; in the middle and lower thirds, the superficial musculoaponeurotic system (SMAS) constitutes the third layer, acting as a cranial extension of the platysma.

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Dissection in the sub-SMAS plane (layer four) allows for effective mobilization but requires expertise because it harbors the facial nerve branches that transit from deep to superficial to innervate the mimetic musculature.

A consistent finding in the literature is the critical role of retaining ligaments. These fibrous structures anchor the superficial layers to the deep fascia (false or fasciocutaneous ligaments) or directly to the bone (true or osteocutaneous ligaments). During aging, the attenuation of these ligaments and the radial expansion of soft tissues contribute significantly to midface ptosis and the appearance of "jowls" along the jawline.

III. SURGICAL TECHNIQUES: FROM SMAS TO THE DEEP PLANE

The systematic review of techniques reveals a classification based on the depth and extent of the dissection. Traditional techniques (SMAS plication or imbrication) are effective for jawline and neck contouring but fail to adequately address midface aging because they do not release the zygomatic and masseteric retaining ligaments.



Figure 1.-Pre surgical marking

To overcome this, extended techniques—particularly the deep plane approach—bypass the fixed lateral portion of the SMAS to directly access the mobile medial portion. By rigorously releasing the retaining ligaments, the surgeon can elevate the medial

facial tissues (including the malar fat pad) as a unified composite flap. This exerts a biomechanically superior vector of traction, achieving midface revolumization without adding external volume and improving the mandibular contour by repositioning tissue over the gonial angle. Alternative and less invasive approaches are also emerging, such as the temporal lift, which utilizes a dissection plane just above the subgaleal fascia.

IV. COMPLEMENTARY PROCEDURES

Since surgical traction does not reverse the volumetric loss of bone and adipose tissue that characterizes aging, autologous fat grafting has become an essential adjunct to rhytidectomy. Strategic fat infiltration helps camouflage skeletal



Figure 3.- Micro fat grafting

deformities such as the tear trough or temporal hollowing, providing a more youthful contour. Similarly, optimizing skin quality through

preoperative regimens and superficial rejuvenation therapies maximizes the patient's overall outcome.

V. PERIOPERATIVE MANAGEMENT AND DECISION MAKING

Surgical success is inextricably linked to comprehensive perioperative management. There is a trend toward the adoption of shared decision-making models, which improve patient satisfaction and compliance while reducing the risk of litigation, often originating from deficits in communicating expectations and risks. Furthermore, intra- and postoperative hemodynamic control, strict smoking cessation, and prophylactic management of nausea are universal trends to mitigate complications.

VI. CRITICAL DISCUSSION

The reviewed literature exposes profound implications for the field of aesthetic surgery: the evolution of techniques is directly guided by anatomical discoveries. The transition toward deep plane



Figure 2.-Superficial plane dissection

dissections reflects a physiological consensus on the need to reposition tissues from their original anchors rather than stretching the skin and lateral SMAS. This philosophy reduces the unnatural appearance typical of excessive traction.

However, existing research exhibits notable limitations. While it is reported that complication rates in deep plane approaches are comparable to or even lower than those of traditional techniques, much of the evidence comes from retrospective analyses and the experiences of highly specialized individual surgeons. There is a significant gap in prospective, randomized, multicenter clinical trials that objectively compare the long-term longevity and morbidity between SMAS and deep plane rhytidectomies. Regarding complementary procedures, autologous fat grafting remains an active subject of debate as it lacks unanimously accepted standardized protocols for processing, and the predictability of its survival in highly mobile areas is erratic.

CONCLUSIONS

Modern rhytidectomy represents a sophisticated synthesis of anatomical science and surgical art. The adoption of deep plane dissections, facilitated by the release of retaining ligaments, combined with three-dimensional volume restoration via fat transfer, constitutes the state of the art for

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obtaining natural and long-lasting results. However, for the field to continue advancing, future research directions must focus on resolving current methodological gaps with greater scientific rigor.

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